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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,214	03/04/2002	Joseph Paul Kuczynski	ROC919980236US2	5014

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EXAMINER

HARAN, JOHN T

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 12/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/090,214

Applicant(s)

KUCZYNSKI, JOSEPH PAUL

Examiner

John T. Haran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 3/4/02 has been considered by the examiner. It is noted that a copy of the 3M article of White Zeosphere Microspheres was not provided so it has not been considered. Additionally a copy of the article could not be found in the parent application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "said photocurable adhesive composition" in lines 5-6. There is insufficient antecedent basis for this limitation in the claim. It is clear from the specification that there is a distinction between adhesive and adhesive composition, the later containing microspheres. It is suggested to amend line 4 to read - - providing a photocurable adhesive composition containing an adhesive and an effective amount of microspheres - - and to delete "containing an adhesive and an effective amount of microspheres" from line 6.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-11, 15-16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hogerton et al (U.S. Patent 5,714,252) in view of Kunitomoto et al (U.S. Patent 5,622,590) taken with Plamthottam et al (U.S. Patent 5,244,962).

Hogerton et al is directed to a method of adhesive bonding wherein an IC chip is bonded to a substrate with an insulating adhesive material, such as epoxy resin, wherein the adhesive material is provided on either the substrate or IC chip, the IC chip and substrate are pressed together with the adhesive in between and the adhesive is cured using well known techniques including use of ultraviolet light (photocuring) (Column 6, lines 44-57 and Column 9, lines 7-8 and 41-51). Hogerton et al is silent towards having an effective amount of microspheres as fillers in the adhesive.

Kunitomoto et al is directed to a method of adhesive bonding an semiconductor chip and a substrate with adhesive wherein the adhesive is an epoxy resin with ceramic filler, such as aluminum nitride or silicon carbonate, that has a high thermal conductivity and therefore reduces the degree of thermal expansion of the resin and reduces stress in the semiconductor device (Column 5, lines 28-38 and Column 6, line 61 to Column 7, line 2). Kunitomoto et al teaches that the ceramic filler particles have a diameter of 5 um (Column 9, lines 52-54). One skilled in the art would have readily appreciated since the particles have a diameter they are spherical and alternatively one skilled in the art would have readily appreciated that it would have been obvious to have microsphere ceramic particles as it is well known and conventional in the art to fill adhesives with

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ceramic microspheres, as shown for example in Plamthottam et al (Column 5, lines 35-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fill the epoxy adhesive of Hogerton with ceramic microspheres in the method of Hogerton as suggested in Kunitomoto et al in order to reduce the degree of thermal expansion and thereby reduce the stress induced in the semiconductor device due to heat generated during bonding and operation of the device.

Regarding claims 2-6, one skilled in the art would have readily appreciated fully curing the adhesive in order to ensure adequate adhesion and that the dose (intensity) and duration of the exposure to ultraviolet radiation would depend upon the materials worked upon. It would have been within the purview and mechanical skill of one skilled in the art to determine the necessary dose and duration of the uv radiation exposure necessary to fully cure the adhesive.

Regarding claim 7, Kunitomoto teaches the microspheres are ceramic.

Regarding claim 8, one skilled in the art would have readily appreciated that the ceramic microspheres of Kunitomoto are solid and additionally using solid ceramic microspheres is obvious and well known and conventional, as shown for example in Plamthottam et al (Column 5, lines 35-40).

Regarding claims 9-11, Kunitomoto et al teaches that preferably the microspheres are 5 μ m in diameter and are 40 wt% of the adhesive composition (Column 9, lines 52-55). Additionally one skilled in the art would have readily appreciated that wt% and diameter of the microspheres would depend upon a variety of factors including the microsphere material and the material of the chip and substrate

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being bonded. It would have been within the purview and mechanical skill of one skilled in the art to determine the necessary diameter and wt% of the microspheres.

Regarding claim 15, it appears from applicant's disclosure that adding the microspheres to the adhesive makes the adhesive composition pseudoplastic and one skilled in the art would readily appreciate that adding the ceramic microspheres to the epoxy resin of Hogerton et al would have the same effect of making the adhesive composition pseudoplastic. The adhesive composition of Hogerton et al, as modified above, is taken as being pseudoplastic.

Regarding claim 16, Kunitimoto et al teaches that adding the ceramic microspheres to the epoxy adhesive results in the adhesive composition having a lower thermal coefficient of expansion than the adhesive alone (Column 5, lines 28-38 and Column 6, line 61 to Column 7, line 2). The adhesive composition of Hogerton et al, as modified above, has a lower thermal coefficient of expansion than the adhesive alone.

Regarding claim 18, Hogerton et al teaches applying the adhesive in either liquid or sheet form (Column 6, lines 47-48). One skilled in the art would have readily appreciated that applying the adhesive as a liquid would necessarily involve flowing because whatever the dispensing mechanism for the liquid adhesive: extruder, screen printer, sprayer, etc.; it would involve the liquid adhesive flowing because the liquid adhesive could not be applied without it flowing to some degree. It is noted that applicant does not teach any examples of flowing in the disclosure but it is examiner's position that any application of liquid adhesive involves flowing. It would have been obvious to one of ordinary skill in the art at the time the invention was made that using a

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liquid adhesive composition in the method of Hogerton et al involves flowing of the adhesive in the application process.

6. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hogerton et al (U.S. Patent 5,714,252) in view of Kunitomoto et al (U.S. Patent 5,622,590) taken with Plamthottam et al (U.S. Patent 5,244,962) as applied to claims 1-11, 15-16, and 18 above, and further in view of Kolesar, Jr. (U.S. Patent 5,008,213).

Hogerton et al and Kunitomoto et al are relied upon for the teachings noted above and are silent towards using an alkali alumino silicate as the ceramic filler.

Kolesar, Jr. is directed to a method of mounting a die to a substrate using an epoxy filled adhesive wherein the filler material is used to adjust the adhesive's thermal coefficient of expansion to match the material of the die and that filler is lithium aluminum silicate (an alkali alumino silicate) (Column 11, lines 18-36). One skilled in the art would have readily appreciated using other known materials for the filler that lower the thermal coefficient of expansion of epoxy resins in the method of Hogerton et al, as modified above. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use lithium aluminum silicate, an alkali alumino silicate, as the filler material for the epoxy resin, in the method of Hogerton et al, as modified above, as suggested in Kolesar, Jr.

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hogerton et al (U.S. Patent 5,714,252) in view of Kunitomoto et al (U.S. Patent

5,622,590) taken with Plamthottam et al (U.S. Patent 5,244,962) and also in view of Belke, Jr. et al (U.S. Patent 5,783,867).

Hogerton et al is directed to a method of adhesive bonding wherein an IC chip is bonded to a substrate with an insulating adhesive material, such as epoxy resin, wherein the adhesive material is provided on either the substrate or IC chip, the IC chip and substrate are pressed together with the adhesive in between and the adhesive is cured using well known techniques including use of ultraviolet light (photocuring) (Column 6, lines 44-57 and Column 9, lines 7-8 and 41-51). Hogerton et al is silent towards having an effective amount of microspheres as fillers in the adhesive.

Kunitomoto et al is directed to a method of adhesive bonding an semiconductor chip and a substrate with adhesive wherein the adhesive is an epoxy resin with ceramic filler, such as aluminum nitride or silicon carbonate, that has a high thermal conductivity and therefore reduces the degree of thermal expansion of the resin and reduces stress in the semiconductor device (Column 5, lines 28-38 and Column 6, line 61 to Column 7, line 2). Kunitomoto et al teaches that the ceramic filler particles have a diameter of 5 μm (Column 9, lines 52-54). One skilled in the art would have readily appreciated since the particles have a diameter they are spherical and alternatively one skilled in the art would have readily appreciated that it would have been obvious to have microsphere ceramic particles as it is well known and conventional in the art to fill adhesives with ceramic microspheres, as shown for example in Plamthottam et al (Column 5, lines 35-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fill the epoxy adhesive of Hogerton with ceramic microspheres in

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the method of Hogerton as suggested in Kunitomoto et al in order reduce the degree of thermal expansion and thereby reduce the stress induced in the semiconductor device due to heat generated during bonding and operation of the device.

Hogerton et al teaches applying the adhesive in either liquid or sheet form (Column 6, lines 47-48), but is silent towards extruding the adhesive, however such is a well known and conventional method for applying adhesive in the art, as shown for example in Belke, Jr. et al (Column 5, lines 43-54). One skilled in the art would have readily appreciated using a well known and conventional application means, such as extrusion, for applying the adhesive. It would have been obvious to one of ordinary skill in the art at the time the invention was made to extrude the adhesive composition with microspheres onto either the substrate or IC chip in the method of Hogerton et al as is well known and conventional in the art.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(571) 272-1217**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (703) 308-3853. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to read "John T. Haran". The signature is stylized with a large initial "J" and a cursive "H".

John T. Haran
Examiner
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